

Section 1 of the Office Action has not even been changed to mention Claims 16-21, which Applicant added since the previous Office Action. However, the last paragraph of section 1 of the

Office Action does discuss those claims and, thus, Applicant will assume that the Office intended to reject those claims. On the other hand, however, there is some incongruity with respect to the discussion/rejection of new claims 16-21 in that the last paragraph of section 1 of the Office Action states that "Anderson, further discloses a switching transistor is a MOFSET and a amplifier as disclosed in column 3, lines 25-26". However, Claims 16, 17 and 19 recite that the switching transistor is a MESFET, not a MOSFET. Furthermore, the purpose of adding these Claims as explained in the previous amendment was to distinguish over MOFSETs. Thus, the statement that the prior art teaches a MOSFET is incongruous with the claim adding to the confusion is the fact that Claim 18 adds the limitation that the switching transistor is "integrally formed with the tuning circuit in a single integrated circuit." The discussion of Claims 16-21 in the Office Action does not appear to address Claim 18.

Accordingly, it is unclear that the Office has fully considered Applicant's previous amendment and remarks. The Final Office Action purports to address some of Applicant's previous arguments, but, raises more questions than it answers with respect to whether the Office has fully and accurately considered Applicant's amendments and remarks. In addressing Applicant's arguments, the Office Action states in its entirety:

Regarding applicant's argument concerning the switching diodes, the examiner contends that the primary reference more than adequately provides support for that limitation. The examiner agrees that the applicant disclosed in prior art the use of diodes for switches, however, the primary reference provides support for this limitation.

Further, the examiner contends that the tuning circuit being tuned by the first impedance element (702) and the second impedance element (703) to receive a first RF signal and to provide the first RF signal at the output port, and the tuning circuit being tuned by the first impedance element (702) alone to receive a second RF signal at the output port.

The examiner contends that Anderson discloses the claimed device except for the switching transistor, it is known in the art to use diodes as switching elements.”

Applicant has difficulty comprehending these responses to its arguments. First, with respect to the first quoted paragraph, the Office appears to be asserting that Anderson discloses switching diodes. It is not clear, however, how this is considered a “response” to Applicant’s argument since it was Applicant who argued that Anderson discloses switching diodes, rather than the claimed switching transistors. Accordingly, as far as Applicant is able to determine, the Office appears to be agreeing with Applicant that Anderson teaches switching diodes, not the claimed switching transistors.

The second above-quoted paragraph is incomprehensible. Applicant is not sure which of its arguments the paragraph is intended to address and, in any event, cannot determine what the Office is trying to say and, therefore, cannot address it.

Finally, the third and last paragraph is incongruous. The first part states that “The Examiner contends that Anderson discloses the claimed device except for switching transistor.” This portion appears to be an accurate description of Applicant’s contention from the previous amendment and appears to indicate that the Office appreciates that the claims claim switching transistors. However, the next part states “it is known in the art to use diodes as switching elements.” This second portion of the sentence seems to indicate that the Office thinks the claim claims switching diodes, rather than switching transistors. Accordingly, it is difficult to decipher the Office’s position based on the text of the Office Action, let alone address it in this response.

In response to the previous Office Action, Applicant also presented arguments with respect to many of the specific limitations in, for instance, Claims 1, 3, and 6-15. The Office did not address any of those arguments in the Final Office Action. Hence, Applicant is left to guess how to respond in this paper.

Accordingly, Applicant will do its best to reiterate and, hopefully, better explain the distinctions previously argued.

The present invention relates to a dual band RF tuning circuit in which frequency tuning is performed by selectively switching inductors or capacitors in and out of functional connection with the received signals. This allows many of the same circuit elements to be used in multiple frequency bands without significant performance degradation or increase in the size of the circuit. In accordance with the invention, MESFET transistor switches are used for band selection and are integral with the tuning circuits. This is the primary distinction of the present invention over the prior art. The prior art circuits of this type use external switching devices, such as double throw switches and switching diodes. Anderson is a primary example of the prior art discussed in the background section of the present application of using switching diodes. In contrast, the integral MESFET switches of the present invention enable fast switching response and low voltage operation compared to the prior art. Further, the MESFET switching circuits are fabricated integrally with the tuning circuit and/are of lower inherent impedance than the discrete switching devices of the prior art. This enables precise tuning in multiple frequency bands.

As best as can be understood, the Office's position appears to be that Anderson teaches the limitations of the claims, except that it teaches switching diodes rather than integral switching MESFET transistors. The Office, however, asserts that Liu teaches switching transistors and that

it is obvious to modify Anderson with Liu's switching transistors for the purpose of having a cheaper and more flexible circuit.

As discussed in detail in the response to the previous Office Action, there are several problems with this rejection. The problems set forth in the previous amendment include:

1. Liu is from a nonanalogous art and, therefore, is not properly combinable with Anderson;
2. There is no suggestion in the prior art to make the proposed combination of Anderson and Liu in any event;
3. The motivation for the combination asserted by the Office is contrary to the actual facts;
4. Liu discloses MOSFET transistors, not MESFET transistors;
5. Liu does not disclose integrally forming the transistor with the band tuning circuit;
6. The proposed combination does not teach "the switching transistor having conducting gates connected to the second impedance element to short the second impedance element" as claimed in Claim 1;
7. The proposed combination does not teach "the first and second impedance elements are capacitive impedance elements" as recited in Claim 3;
8. The proposed combination does not teach "a resistance connected across the conducting gates of the switching transistor" as recited in Claim 6;
9. The proposed combination does not disclose "the source of band control voltage being connected to a dividing point of the resistance" as claimed in Claim 6;

10. The proposed combination does not disclose "the conducting drain and source nodes of the switching transistors being in series connection with the second impedance elements to open circuit the second impedance element" as recited in Claim 6;

11. The proposed combination does not disclose "the first and second impedance elements are capacitance impedance elements" as recited in Claim 7;

12. The proposed combination does not disclose that the voltage divider "has a current blocking resistance in parallel connection with the conducting drain and source nodes of the switching transistor" as recited in Claim 8;

13. The proposed combination does not teach "the source of band control voltage is connected through a second resistor to the dividing point of the first resistance" as is recited in Claim 8;

14. The proposed combination does not disclose "the conducting drain and source nodes of the first switching transistor being in parallel connection with the second inductance impedance element to short the second inductance impedance element" as recited in Claim 10;

15. The proposed combination does not teach "a first resistance connected to a gate of the first switching transistor" as recited in Claim 11;

16. The proposed combination does not disclose "the source of band control voltage being connected to a dividing point of the first resistance" as recited in Claim 11;

17. The proposed combination does not disclose "the conducting drain and source nodes of the second switching transistor being a series connection with the second capacitance impedance element to short the second capacitance impedance element" as recited in Claim 11;

18. The proposed combination does not teach “the first resistance is a current blocking resistance in the parallel invention with conducting drain and source nodes of the switching transistor” as recited in Claim 12;

19. The proposed combination does not disclose “the source of band control multitudes connected through a second resister to a dividing point of the first resistance” as recited in Claim 12; and

20. The proposed combination does not disclose that “the first switching transistor is an EFET transistor” or that “a further resistor is referenced to ground any connected at the gate of the EFET transistor” as recited in Claim 13.

With respect to new claims 16-21, the proposed combination does not teach:

1. “[T]he switching transistor is a MESFET” as recited in claims 16 and 19;
2. “[T]he 13 transistor is integrally formed with the tuning circuit in a single integrated circuit” as is recited in claims 17 and 20; or
3. “[S]aid switching transistor is integrally formed with the tuning circuit in a single integrated circuit” as recited in Claim 18.

It is apparent from the fact that the Office rejected all claims, that the Office did not find any of Applicant’s arguments persuasive. However, unfortunately, the Office has offered no substantive response to the those arguments or any detailed discussion of the references, such as where the above noted elements are found in the references, how the references should be combined to arrive at the present invention as claimed, or where the motivation to make any such combination might be found in the prior art. Hence, from a substantive perspective, Applicant can do no more than simply reassert the previous arguments and, hopefully, explain them better.

In short, Anderson teaches nothing more than what Applicant has already admitted as prior art in the Background section of the application (see the discussion of US patent No. 4,379,269 contained on page 2, line 29 through page 3, line 25) and Liu teaches nothing more than that a transistor can be used as a switch. The relevant portion of Anderson is the tunable filter 7 and particularly, inductors 701, 702, 703, 704, 705, 706, bandswitching diodes 713, 715, and 717, inductor 719 and 723 and varactor diodes 707a and 707b.

The primary purpose of tunable filter 7 of Anderson is to exhibit a band pass amplitude versus frequency response that allows the RF signal corresponding to a channel to be tuned to each RF amplifier 9 while inhibiting other RF signals from reaching RF amplifier 9 (Col.2, lines 34-38). More particularly, referring to the sole figure in the Anderson patent, tuning diodes 713, 715, and 717 are controlled by bandswitching signals BS1 and BS2 to selectively configure the inductors 701, 702, 703, 704, 706 to selectively adjust the band pass amplitude versus frequency response of tunable filter 7. A secondary purpose of tunable filter 7 is to selectively switch capacitor 723 in and out of the circuit to selectively generate a frequency trap (e.g., at 177 MHZ) to improve tuning performance with respect to channels 6 and 7 of a t.v. tuner (see Col.7, line 3 through Col.8, line 54).

In essence, Anderson contains nothing relevant beyond that which Applicant has already admitted as prior art in its discussion of US patent No. 4,379,269 contained on page 2, line 29 through page 3, line 25 of the present specification. Like the 4,379,269 patent, Anderson uses switching diodes to adjust the frequency of the tuner. As discussed on page 3, lines 17-25 of the present specification, a disadvantage of this type of switching is its unsuitability for low voltage applications, such as personal communication devices, because the switching diode is a discrete circuit element requiring significant voltage for its bias, either forward or backward. Further, the

switching diode is an active device having it's own characteristics as a reactive element with capacitance and inductance values that deter the precise tuning of the circuit to different frequency bands.

Anderson's bandswitching diode 713, 715, and 717 suffer from these exact same problems. For instance, as noted in Col.5, line 66 and Col.6, line 14, Anderson's bandswitching diodes 713, 715, and 717 require bias voltages on the order of the -12 to +12 volts. This is a requirement that certainly is unacceptable low voltage circuits.

In one sense, the invention of the present application over the prior art (the 4,379,269 patent as well as Anderson) comprises the replacement of separate diodes with MESFET transistors that are fabricated integrally with the RF tuning circuit. This enables fast switching response and low voltage operation. The MESFET switch transistors have lower inherent impedances than discrete switching devices, which enable precise tuning to multiple frequency bands. Liu does not teach this, or any reason, for that matter to replace Anderson's diodes with Liu's MOSFETs.

The Office's assertion that it would have been obvious to substitute Liu's transistors for Anderson's diodes "for the purpose of having a cheaper and more flexible circuit" is not even accurate. Such a substitution, in fact, would make the circuit more expensive and less flexible. Liu's switches Q1 and Q2 each comprise diodes in addition to the MOSFET transistors. Accordingly, the substitution of Liu's switches into Anderson does not result in the replacement of Anderson's diode switches with transistor switches, but results in the replacement of Anderson's diode switches with switches that include both diodes and transistors (and capacitors, for that matter). Accordingly, the proposed combination results in a circuit that is more expensive and less flexible than Anderson, not the opposite as asserted by the Office.

Furthermore, Liu is not in the same field of endeavor as the present invention. Liu relates to DC/DC converters and has nothing to do with adjusting the frequency of RF tuning circuits.

The Liu reference discloses a half-bridge zero-voltage-switched PWM fly back DC/DC converter in which MOSFET transistors Q1 and Q2 are used as switches. Liu has nothing to do with RF tuning circuits, but relates to DC/DC converters. Accordingly, Liu's relevance to the present application essentially is that it generically discloses that a transistor can be used as a switch. A DC/DC converter as in Liu must deal with very high voltages, on the order of hundreds of volts. Accordingly, it is even less flexible than an unmodified Anderson circuit in that the components are designed to operate at extremely high voltages. It would make no sense for a person of skill in the related arts to look to a high voltage circuit such as Liu for inspiration as to how to improve circuit performance in a low voltage environment such as the present invention and Anderson. The present invention involves specific circuit components and circuit fabrication details and such details are totally different for high voltage versus low voltage circuits.

Accordingly, the proposed combination clearly is not suggested in the prior art.

Even accepting the proposed substitution, it still would not read on the claimed invention. At a minimum, proposed substitution would not meet the limitation of "the switching transistor having conducting gates connected to the second impedance element to short the second impedance element". Which of inductors 701, 702, 703, 704, 705 and 706, does the Office consider to be the first and second impedances? In Anderson, in bands 1 and 2, inductor 701, 702, 703, 704, and 705 dictate the response of tunable filter 7, whereas, in band 3, only inductor 705 and 706 dictate the response of tunable filter 7. However, none of the band switching diodes 713, 715, or 717 "short" any of the inductors when in the low impedance/conducting state. That

is, none of the bandswitching diodes 713, 715, and 717 is purely parallel with any of the inductors 701, 702, 703, 704, 705, or 706.

Even further, dependent claim 3 recites that “the first and second impedance element are capacitance impedance elements”. Anderson clearly does not meet those limitations.

With respect to claim 6, Anderson clearly does not teach “a resistance connected across the conducting gates of the switching transistor” let alone “the source of band control voltage being connected to a dividing point of the resistance” (see Fig. 2 of the present application) or “the conducting drain and source nodes of the switching transistor being in series connection with the second impedance element to open circuit the second impedance element”. The Office asserted that Anderson discloses a resistance 919 connected across the conducting gates of the transistor 901 and the drain and source nodes of the transistor 919 being in series as disclosed in Col.3, lines 1-5 of Anderson. However, transistor 901 and resistance 919 have absolutely nothing to do with the bandswitching diodes 713, 715, and 717. In fact, they have nothing to do with tunable filter 7. Rather, they are components of RF amplifier 9 and, therefore, are not relevant portions of Anderson’s overall circuit. It is clearly seen in Anderson that none of the bandswitching diodes 713, 715 and 717 are connected in series with any of the inductors.

Even further, claim 7 depends from claim 6 and further adds that “the first and second impedance elements are capacitance impedance elements”. This clearly is not taught by Anderson.

Even further, claim 8 depends from claim 6 and recites that the voltage divider “has a current blocking resistance in parallel in connection with the conducting drain and source nodes of the switching transistor” and “the source of band control voltage is connected through a

resister to a dividing point of the current blocking resistance". There is nothing in Anderson that even remotely resembles the claimed structure, even in RF amplifier 9.

Accordingly, claim 1 and it's dependent claims 2-8 clearly distinguish over the prior art of record for reasons set forth above and should be deemed allowable.

Dependent claim 10 adds "a current blocking resistance and parallel connection with the second inductance impedance element, and the conducting drain and source nodes of the switching transistor being in parallel connection with the second inductance impedance element to short the second inductance impedance element". Anderson does not have anything that remotely resembles this circuit structure. With respect to claim 10, the Office again referred to resistance 919 and transistor 901 of RF amplifier 9. However, as noted above, RF amplifier 9 has nothing to do with tunable filter 7. Even if it did, it still does not meet the limitations as there does not appear to be an inductance impedance element in RF amplifier 9 that is in parallel with any resister in RF amplifier 9.

Claim 11 depends from claim 9 and further adds "a resistance connected across the conducting gates of the switching transistor" and "the source of band control voltage being connected to a dividing point of the resistance" and "the conducting drain and source nodes of the switching transistor being in series connection with the second capacitance impedance element to short the second capacitance impedance element". There is nothing in tunable filter 7 of Anderson that resembles these limitations. The Office referred to component RF amplifier 9, which has nothing to do with the tunable filter 7, in any event. Even looking at RF amplifier 9, it clearly does not have any band control voltage connected in RF amplifier 9.

Claim 12 recites that "the resistance is a current blocking resistance in parallel connection with conducting drain and source nodes of the switching transistor, and the source of band

control voltages connected through a resistor to a dividing point of the current blocking resistance. Nothing like this is found in Anderson's tunable filter 7. Even if we consider RF amplifier 9 to be relevant, it does not receive any band control voltage and, therefore, cannot possibly meet the limitations of this claim.

With respect to claims 13, 14, and 15, the Office referred to Col.3, lines 25-26 of Anderson (which discusses that the local oscillator 15 has a tunable filter and an amplifier) and asserted that it teaches that the switching transistor is a FET". However, local oscillator 15 is a separate circuit component from either RF amplifier 9 or tunable filter 7 and does not appear to have any pertinent connection to tunable filter 7 or RF amplifier 9.

The manner in which the Office believes that this has any bearing on what is claimed in claims 13-15 is entirely unclear. First, the Office already conceded that Anderson does not disclose a switching transistor (and instead relied on Liu for the teaching of the switching transistor). Accordingly, the assertion that Anderson discloses that the switching transistor is a FET does not make any sense. Nevertheless, it has been repeated in the Final Office Action despite the fact that Applicant already pointed this out to the Office in the previous amendment.

Further, even if we look to transistor 901 in RF amplifier 9, as somehow relevant, Anderson expressly discloses that this transistor is a MOSFET, not an EFET as claimed.

As set forth in MPEP Section 2143, the elements of a proper obviousness rejection are:

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

As clearly set forth above, the Office has met none of the three requirements of a proper obviousness rejection set forth in MPEP §2143 . It has not (1) disclosed where in the references the argued missing elements are found, (2) explained what combination would be necessary to result in those limitations being met, or (3) offered a rational explanation of the motivation in the prior art to make the necessary combination. Since Applicant had previously explained the shortcomings of the Office's prior art rejections and specifically asked the Office to provide such information, but instead the Office simply resubmitted a verbatim copy of the previous inadequate rejections, the rejection is *prima facie* invalid and should be withdrawn.

As set forth in MPEP § 2144.08 III (MPEP p. 2100-116):

Thus, once the applicant has presented rebuttal evidence, Office personnel should reconsider any initial obviousness determination in view of the entire record . . . The Office action should clearly communicate the Office's findings and conclusions, articulating how the conclusions are supported by the findings.

...
Where applicable, the findings should clearly articulate which portions of the reference support any rejection. Explicit findings on motivation or suggestion to select the claimed invention should also be articulated in order to support a 35 U.S.C. 103 ground of rejection.

None of this appears to have been done in the present case, as set forth in detail above. Hence, the 103 rejection should be withdrawn.

In view of the foregoing amendments and remarks, this application is now in condition for allowance. Applicant respectfully requests the Examiner to issue a Notice of Allowance at

the earliest possible date. The Examiner is invited to contact Applicant's undersigned counsel by telephone call in order to further the prosecution of this case in any way.

Respectfully submitted,

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